Plan and design structures, such as private residences, office buildings, theaters, factories, and other structural property. *Examples: Architectural Designer; Building Consultant; Site Planner* 

### Training Category: Degree plus work experience

\$32.69
318
375
17.9%
12

Indus	stry	2006 Share	2016 Share
5413	Architectural and Engineering Services	67.6%	70.1%
	Self-Employed Workers	20.4%	18.1%
236	Construction of Buildings	n	n
238	Specialty Trade Contractors	n	n
6113	Colleges and Universities	n	n
	•		

# 17-1012 Landscape Architects

FA

Plan and design land areas for such projects as parks and other recreational facilities, airports, highways, hospitals, schools, land subdivisions, and commercial, industrial, and residential sites. *Examples: Environmental Planner; Land Planner; Landscape Designer* 

\$35.06
82
99
20.7%
4

Indus	stry	2006 Share	2016 Share
	Self-Employed Workers	18.3%	17.2%
	Federal Government, ex. Postal Service	1.2%	1.0%
444	Building Material & Garden Supply Stores	n	n
5413	Architectural and Engineering Services	n	n
5414	Specialized Design Services	n	n
5617	Services to Buildings and Dwellings	n	n

### 17-1021 Cartographers and Photogrammetrists

LS

Collect, analyze, and interpret geographic information provided by geodetic surveys, aerial photographs, and satellite data. Research, study, and prepare maps and other spatial data in digital or graphic form for legal, social, political, educational, and design purposes. May work with Geographic Information Systems (GIS). May design and evaluate algorithms, data structures, and user interfaces for GIS and mapping systems. *Examples: Field Map Editor; Mapper* 

### Training Category: Bachelor's degree

į	2007 Average Wage:	\$19.34
i	2006 Estimated Employment:	83
ĺ	2016 Projected Employment:	93
l	Growth Rate, 2006-2016:	12.0%
ļ	Annual Openings:	4

Indus	stry	2006 Share	2016 Share
	Local Government, ex. Education	15.7%	15.1%
	State Government, ex. Education and Hospitals	13.3%	12.9%
511	Publishing Industries	n	n
5413	Architectural and Engineering Services	n	n
713	Amusements, Gambling, and Recreation	n	n
813	Religious, Grantmaking, Civic, Prof, & Similar Ord	gs n	n

### 17-1022 Surveyors

VF

Make exact measurements and determine property boundaries. Provide data relevant to the shape, contour, gravitation, location, elevation, or dimension of land or land features on or near the earth's surface for engineering, mapmaking, mining, land evaluation, construction, and other purposes. *Examples: Geodetic Surveyor; Land Examiner; Mineral Surveyor* 

### Training Category: Bachelor's degree

2007 Average Wage:	\$25.15
2006 Estimated Employment:	296
2016 Projected Employment:	364
Growth Rate, 2006-2016:	23.0%
Annual Openings:	16

Industry		2006 Share	2016 Share
5413	Architectural and Engineering Services	79.4%	82.4%
	Self-Employed Workers	3.7%	3.0%
	Local Government, ex. Education	1.0%	1.1%
221	Utilities	n	n
236	Construction of Buildings	n	n
511	Publishing Industries	n	n

### 17-2011 Aerospace Engineers

LS

Perform a variety of engineering work in designing, constructing, and testing aircraft, missiles, and spacecraft. May conduct basic and applied research to evaluate adaptability of materials and equipment to aircraft design and manufacture. May recommend improvements in testing equipment and techniques. Examples: Aerodynamicist; Flight Test Engineer; Aeronautical Engineer

#### Training Category: Bachelor's degree

2007 Average Wage:	\$48.74
2006 Estimated Employment:	n
2016 Projected Employment:	n
Growth Rate, 2006-2016:	n
Annual Openings:	n

Indus	stry	2006 Share	2016 Share
336	Transportation Equipment Manufacturing	n	n
5417	Scientific Research and Development Svcs	n	<u>n</u>

# 17-2031 Biomedical Engineers

LS

Apply knowledge of engineering, biology, and biomechanical principles to the design, development, and evaluation of biological and health systems and products, such as artificial organs, prostheses, instrumentation, medical information systems, and heath management and care delivery systems. *Example: Orthopedic Designer* 

2007 Average Wage:	\$27.72
2006 Estimated Employ	yment: 48
2016 Projected Employ	ment: 53
Growth Rate, 2006-201	<b>6</b> : 10.4%
Annual Openings:	2

Indus	stry	2006 Share	2016 Share
339	Miscellaneous Manufacturing	n	n
5413	Architectural and Engineering Services	n	n
5417	Scientific Research and Development Svcs	n	n
621	Ambulatory Health Care Services	n	n
622	Hospitals	n	n
	•		

### 17-2041 Chemical Engineers

ΙF

Design chemical plant equipment and devise processes for manufacturing chemicals and products, such as gasoline, synthetic rubber, plastics, detergents, cement, paper, and pulp, by applying principles and technology of chemistry, physics, and engineering. *Examples: Absorption and Adsorption Engineer; Explosives Engineer* 

#### Training Category: Bachelor's degree

\$34.92
61
62
1.6%
2

Industry		2006 Share	2016 Share
212	Mining (except Oil and Gas)	n	n
325	Chemical Manufacturing	n	n
326	Plastics & Rubber Products Manufacturing	n	n
334	Computer and Electronic Product Mfg	n	n
339	Miscellaneous Manufacturing	n	n
5417	Scientific Research and Development Svcs	n	n

# 17-2051 Civil Engineers

۷F

Perform engineering duties in planning, designing, and overseeing construction and maintenance of building structures, and facilities, such as roads, railroads, airports, bridges, harbors, channels, dams, irrigation projects, pipelines, power plants, water and sewage systems, and waste disposal units. Include architectural, structural, traffic, ocean, and geo-technical engineers. *Examples: Bridge Engineer; Construction Engineer; Concrete Engineer* 

#### Training Category: Bachelor's degree

2007 Average Wage:	\$32.37
2006 Estimated Employment:	1,082
2016 Projected Employment:	1,291
Growth Rate, 2006-2016:	19.3%
Annual Openings:	50

Indus	stry	2006 Share	2016 Share
	State Government, ex. Education and Hospitals	20.2%	17.9%
	Local Government, ex. Education	5.0%	4.8%
	Self-Employed Workers	4.9%	4.3%
	Federal Government, ex. Postal Service	3.0%	2.3%
237	Heavy and Civil Engineering Construction	2.1%	2.0%
5413	Architectural and Engineering Services	n	n

# 17-2061 Computer Hardware Engineers

Α

Research, design, develop, and test computer or computer-related equipment for commercial, industrial, military, or scientific use. May supervise the manufacturing and installation of computer or computer-related equipment and components.

### Training Category: Bachelor's degree

2007 Average Wage:	\$50.39
2006 Estimated Employment:	n
2016 Projected Employment:	n
Growth Rate, 2006-2016:	n
Annual Openings:	n

Industry		2006 Share	2016 Share
5415	Computer Systems Design & Related Svcs	8.5%	11.1%
	Self-Employed Workers	3.7%	3.6%
334	Computer and Electronic Product Mfg	n	n
423	Merchant Wholesalers, Durable Goods	n	n
517	Telecommunications	n	n
5413	Architectural and Engineering Services	n	n

### 17-2071 Electrical Engineers

FA

Design, develop, test, or supervise the manufacturing and installation of electrical equipment, components, or systems for commercial, industrial, military, or scientific use. *Examples: Power Distribution Engineer; Illuminating Engineer; Relay Engineer* 

_		
Ī	2007 Average Wage:	\$36.95
į	2006 Estimated Employment:	1,090
l	2016 Projected Employment:	1,120
ŀ	Growth Rate, 2006-2016:	2.8%
ŀ	Annual Openings:	28

Industry		2006 Share	2016 Share
5413	Architectural and Engineering Services	6.7%	8.3%
333	Machinery Manufacturing	5.6%	5.7%
423	Merchant Wholesalers, Durable Goods	5.1%	5.9%
335	Electrical Equipment and Appliances	4.3%	4.8%
221	Utilities	n	n
334	Computer and Electronic Product Mfg	n	n

### 17-2072 Electronics Engineers, Except Computer

FA

Research, design, develop, and test electronic components and systems for commercial, industrial, military, or scientific use utilizing knowledge of electronic theory and materials properties. Design electronic circuits and components for use in fields such as telecommunications, aerospace guidance and propulsion control, acoustics, or instruments and controls. *Examples: Communications Engineer; Circuit Design Engineer; Guidance and Control Systems Engineer* 

### Training Category: Bachelor's degree

2007 Average Wage:	\$46.61
2006 Estimated Employment:	909
2016 Projected Employment:	983
Growth Rate, 2006-2016:	8.1%
Annual Openings:	28

Industry		2006 Share	2016 Share
	Self-Employed Workers	2.2%	2.2%
334	Computer and Electronic Product Mfg	n	n
335	Electrical Equipment and Appliances	n	n
423	Merchant Wholesalers, Durable Goods	n	n
517	Telecommunications	n	n
5413	Architectural and Engineering Services	n	n

# 17-2081 Environmental Engineers

۷F

Design, plan, or perform engineering duties in the prevention, control, and remediation of environmental health hazards utilizing various engineering disciplines. Work may include waste treatment, site remediation, or pollution control technology. *Examples: Soil Engineer; Industrial Hygiene Engineer; Pollution Control Engineer* 

### Training Category: Bachelor's degree

\$31.33
163
206
26.4%
9

Industry		2006 Share	2016 Share	
	5416	Management & Technical Consulting Svcs	27.6%	31.1%
		State Government, ex. Education and Hospitals	11.7%	9.7%
		Local Government, ex. Education	6.8%	5.8%
	334	Computer and Electronic Product Mfg	n	n
	5413	Architectural and Engineering Services	n	n
	562	Waste Management and Remediation Service	n	n

# 17-2111 Health and Safety Engineers, Except Mining Safety Engineers and Inspectors

LS

Promote worksite or product safety by applying knowledge of industrial processes, mechanics, chemistry, psychology, and industrial health and safety laws. Examples: Fire-Protection Engineer; Product Safety Engineer

### Training Category: Bachelor's degree

2007 Average Wage: 2006 Estimated Employment: 2016 Projected Employment: Growth Rate, 2006-2016: Annual Openings:	\$32.94 50 56 12.0% 2
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Indus	stry	2006 Share	2016 Share
	State Government, ex. Education and Hospitals	12.0%	10.7%
236	Construction of Buildings	n	n
237	Heavy and Civil Engineering Construction	n	n
325	Chemical Manufacturing	n	n
335	Electrical Equipment and Appliances	n	n
336	Transportation Equipment Manufacturing	n	n

# 17-2112 Industrial Engineers

۷F

Design, develop, test, and evaluate integrated systems for managing industrial production processes including human work factors, quality control, inventory control, logistics and material flow, cost analysis, and production coordination. *Examples: Packaging Engineer; Time Study Engineer; Plant Engineer* 

2007 Average Wage:	\$35.67
2006 Estimated Employment:	776
2016 Projected Employment:	935
Growth Rate, 2006-2016:	20.5%
Annual Openings:	35

Indus	stry	2006 Share	2016 Share
333	Machinery Manufacturing	7.6%	8.0%
326	Plastics & Rubber Products Manufacturing	7.4%	7.3%
339	Miscellaneous Manufacturing	6.8%	6.3%
332	Fabricated Metal Product Manufacturing	4.9%	5.4%
334	Computer and Electronic Product Mfg	n	n
336	Transportation Equipment Manufacturing	n	n

# 17-2131 Materials Engineers

FΔ

Evaluate materials and develop machinery and processes to manufacture materials for use in products that must meet specialized design and performance specifications. Develop new uses for known materials. Include those working with composite materials or specializing in one type of material, such as graphite, metal and metal alloys, ceramics and glass, plastics and polymers, and naturally occurring materials. *Example:* Corrosion Engineer

### Training Category: Bachelor's degree

2007 Average Wage:	\$35.64
2006 Estimated Employment:	138
2016 Projected Employment:	153
Growth Rate, 2006-2016:	10.9%
Annual Openings:	5

Indus	stry	2006 Share	2016 Share
334	Computer and Electronic Product Mfg	29.0%	28.1%
326	Plastics & Rubber Products Manufacturing	n	n
331	Primary Metal Manufacturing	n	n
332	Fabricated Metal Product Manufacturing	n	n
339	Miscellaneous Manufacturing	n	n
5417	Scientific Research and Development Svcs	n	n

### 17-2141 Mechanical Engineers

FΑ

Perform engineering duties in planning and designing tools, engines, machines, and other mechanically functioning equipment. Oversee installation, operation, maintenance, and repair of such equipment as centralized heat, gas, water, and steam systems. *Examples: Combustion Engineer; Plant Equipment Engineer; Hydraulic Engineer* 

### Training Category: Bachelor's degree

2007 Average Wage:	\$34.76
2006 Estimated Employment:	1,460
2016 Projected Employment:	1,527
Growth Rate, 2006-2016:	4.6%
Annual Openings:	39

Indus	stry	2006 Share	2016 Share
334	Computer and Electronic Product Mfg	27.0%	25.1%
332	Fabricated Metal Product Manufacturing	17.7%	18.2%
333	Machinery Manufacturing	17.1%	17.8%
326	Plastics & Rubber Products Manufacturing	7.2%	6.5%
5417	Scientific Research and Development Svcs	6.2%	6.5%
5413	Architectural and Engineering Services	n	n

# 17-2199 Engineers, All Other

FA

All engineers not listed separately. Examples: Optical Engineer; Salvage Engineer; Ordnance Engineer

### Training Category: Bachelor's degree

2007 Average Wage:	\$38.87
2006 Estimated Employment:	1,513
2016 Projected Employment:	1,602
Growth Rate, 2006-2016:	5.9%
Annual Openings:	27

Indus	stry	2006 Share	2016 Share
334	Computer and Electronic Product Mfg	29.2%	26.2%
5413	Architectural and Engineering Services	8.7%	10.3%
	Self-Employed Workers	6.4%	6.4%
5417	Scientific Research and Development Svcs	4.8%	5.0%
333	Machinery Manufacturing	n	n
425	Electronic Markets and Agents/Brokers	n	n

### 17-3011 Architectural and Civil Drafters

FΑ

Prepare detailed drawings of architectural and structural features of buildings or drawings and topographical relief maps used in civil engineering projects, such as highways, bridges, and public works. Utilize knowledge of building materials, engineering practices, and mathematics to complete drawings. *Example: Structural Drafter* 

### Training Category: Associate's degree

2007 Average Wage:	\$21.61
2006 Estimated Employment:	517
2016 Projected Employment:	546
Growth Rate, 2006-2016:	5.6%
Annual Openings:	18

Indus	stry	2006 Share	2016 Share
5413	Architectural and Engineering Services	66.7%	67.0%
	Self-Employed Workers	5.0%	4.8%
236	Construction of Buildings	n	n
238	Specialty Trade Contractors	n	n
321	Wood Product Manufacturing	n	n
5414	Specialized Design Services	n	n

#### 17-3012 Electrical and Electronics Drafters

LS

Prepare wiring diagrams, circuit board assembly diagrams, and layout drawings used for manufacture, installation, and repair of electrical equipment in factories, power plants, and buildings.

### Training Category: Associate's degree

\$26.84
209
211
1.0%
6

Industry		2006 Share	2016 Share
334	Computer and Electronic Product Mfg	67.9%	64.9%
	Self-Employed Workers	5.7%	5.7%
221	Utilities	n	n
238	Specialty Trade Contractors	n	n
335	Electrical Equipment and Appliances	n	n
5413	Architectural and Engineering Services	n	n

#### 17-3013 Mechanical Drafters

FA

Prepare detailed working diagrams of machinery and mechanical devices, including dimensions, fastening methods, and other engineering information. *Example: Aeronautical Drafter* 

### Training Category: Associate's degree

2007 Average Wage:	\$21.61
2006 Estimated Employment:	194
2016 Projected Employment:	215
Growth Rate, 2006-2016:	10.8%
Annual Openings:	8

Industry		2006 Share	2016 Share
332	Fabricated Metal Product Manufacturing	26.3%	27.9%
333	Machinery Manufacturing	22.2%	20.9%
	Self-Employed Workers	5.7%	5.6%
326	Plastics & Rubber Products Manufacturing	n	n
334	Computer and Electronic Product Mfg	n	n
5413	Architectural and Engineering Services	n	n

# 17-3019 Drafters, All Other

FΑ

All drafters not listed separately. Examples: Geological Drafter; Hull Drafter

### Training Category: Associate's degree

2007 Average Wage: 2006 Estimated Employment:	\$21.20 179
2016 Projected Employment:	204
Growth Rate, 2006-2016:	14.0%
Annual Openings:	8

Industry		2006 Share	2016 Share
236	Construction of Buildings	n	n
238	Specialty Trade Contractors	n	n
334	Computer and Electronic Product Mfg	n	n
425	Electronic Markets and Agents/Brokers	n	n
443	Electronics and Appliance Stores	n	n
5413	Architectural and Engineering Services	n	n

### 17-3021 Aerospace Engineering and Operations Technicians

LS

Operate, install, calibrate, and maintain integrated computer/communications systems consoles, simulators, and other data acquisition, test and measurement instruments and equipment. *Example: Flight Data Technician* 

### Training Category: Associate's degree

2007 Average Wage:	n/a
2006 Estimated Employment:	n
2016 Projected Employment:	n
Growth Rate, 2006-2016:	n
Annual Openings:	n

Indu	stry	2006 Share	2016 Share
336	Transportation Equipment Manufacturing	n	n
339	Miscellaneous Manufacturing	n	n
517	Telecommunications	n	n

### 17-3022 Civil Engineering Technicians

FΔ

Apply theory and principles of civil engineering in planning, designing, and overseeing construction and maintenance of structures and facilities under the direction of engineering staff or physical scientists. *Example: Highway Technician* 

#### Training Category: Associate's degree

   	2007 Average Wage:	\$23.35
i I	2006 Estimated Employment:	183
 	2016 Projected Employment:	207
 	Growth Rate, 2006-2016:	13.1%
 	Annual Openings:	6

Industry		2006 Share	2016 Share
5413	Architectural and Engineering Services	78.1%	79.7%
	Local Government, ex. Education	11.5%	11.6%
	Self-Employed Workers	1.1%	1.0%
221	Utilities	n	n
6113	Colleges and Universities	n	n

### 17-3023 Electrical and Electronic Engineering Technicians

FΑ

Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, calibrate, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions. *Examples: Calibration Laboratory Technician; Semiconductor Development Technician; Instrumentation Technician* 

### Training Category: Associate's degree

2007 Average Wage:	\$22.82
2006 Estimated Employment:	978
2016 Projected Employment:	989
Growth Rate, 2006-2016:	1.1%
Annual Openings:	20

Industry		2006 Share	2016 Share
334	Computer and Electronic Product Mfg	56.3%	52.8%
333	Machinery Manufacturing	4.6%	4.8%
491	Postal Service	4.4%	4.5%
335	Electrical Equipment and Appliances	n	n
423	Merchant Wholesalers, Durable Goods	n	<u>n</u>
425	Electronic Markets and Agents/Brokers	n	n

#### 17-3024 Electro-Mechanical Technicians

\_F

Operate, test, and maintain unmanned, automated, servo-mechanical, or electromechanical equipment. May operate unmanned submarines, aircraft, or other equipment at worksites, such as oil rigs, deep ocean exploration, or hazardous waste removal. May assist engineers in testing and designing robotics equipment.

#### Training Category: Associate's degree

2007 Average Wage: 2006 Estimated Employment: 2016 Projected Employment: Growth Rate, 2006-2016: Annual Openings:	\$23.74 98 103 5.1% 3
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Indus	stry	2006 Share	2016 Share
334	Computer and Electronic Product Mfg	43.9%	40.8%
333	Machinery Manufacturing	n	n
335	Electrical Equipment and Appliances	n	n
336	Transportation Equipment Manufacturing	n	n
5419	Other Professional & Technical Services	n	n
713	Amusements, Gambling, and Recreation	n	n

# 17-3025 Environmental Engineering Technicians

FA

Apply theory and principles of environmental engineering to modify, test, and operate equipment and devices used in the prevention, control, and remediation of environmental pollution, including waste treatment and site remediation. May assist in the development of environmental pollution remediation devices under direction of engineer. *Examples: Air Analysis Technician; Soil Technician* 

### Training Category: Associate's degree

2007 Average Wage:	\$24.56
2006 Estimated Employment:	65
2016 Projected Employment:	82
Growth Rate, 2006-2016: Annual Openings:	26.2% 3

Indus	stry	2006 Share	2016 Share
221	Utilities	n	n
334	Computer and Electronic Product Mfg	n	n
339	Miscellaneous Manufacturing	n	n
5413	Architectural and Engineering Services	n	n
5416	Management & Technical Consulting Svcs	n	n
562	Waste Management and Remediation Service	n	n

### 17-3026 Industrial Engineering Technicians

FΑ

Apply engineering theory and principles to problems of industrial layout or manufacturing production, usually under the direction of engineering staff. May study and record time, motion, method, and speed involved in performance of production, maintenance, clerical, and other worker operations for such purposes as establishing standard production rates or improving efficiency. *Examples: Methods Study Analyst; Quality Control Technician; Time Study Analyst* 

### Training Category: Associate's degree

\$22.70
339
381
12.4%
11

Indus	stry	2006 Share	2016 Share
333	Machinery Manufacturing	11.2%	11.8%
331	Primary Metal Manufacturing	n	n
332	Fabricated Metal Product Manufacturing	n	<u>n</u>
334	Computer and Electronic Product Mfg	n	n
335	Electrical Equipment and Appliances	n	n
423	Merchant Wholesalers, Durable Goods	n	n

### 17-3027 Mechanical Engineering Technicians

ıs

Apply theory and principles of mechanical engineering to modify, develop, and test machinery and equipment under direction of engineering staff or physical scientists. *Examples: Heat Transfer Technician; Optomechanical Technician; Tool Analyst* 

#### Training Category: Associate's degree

\$21.79
340
358
5.3%
9

Indus	strv	2006 Share	2016 Share
333	Machinery Manufacturing	26.2%	27.1%
5417	Scientific Research and Development Svcs	16.8%	17.6%
332	Fabricated Metal Product Manufacturing	8.8%	8.9%
326	Plastics & Rubber Products Manufacturing	8.5%	7.5%
327	Nonmetallic Mineral Product Mfg	n	n
334	Computer and Electronic Product Mfg	n	n

# 17-3029 Engineering Technicians, Except Drafters, All Other

S

All engineering technicians, except drafters, not listed separately. Examples: Laser Specialist; Metallurgical Technician; Material Stress Tester

#### Training Category: Associate's degree

2007 Average Wage:	\$21.78
2006 Estimated Employment:	578
2016 Projected Employment:	577
Growth Rate, 2006-2016:	-0.2%
Annual Openings:	11

Indus	stry	2006 Share	2016 Share
	State Government, ex. Education and Hospitals	23.7%	25.1%
339	Miscellaneous Manufacturing	11.3%	10.4%
	Federal Government, ex. Postal Service	8.1%	7.5%
333	Machinery Manufacturing	n	n
334	Computer and Electronic Product Mfg	n	n
5413	Architectural and Engineering Services	n	n

### 17-3031 Surveying and Mapping Technicians

VF

Perform surveying and mapping duties, usually under the direction of a surveyor, cartographer, or photogrammetrist to obtain data used for construction, mapmaking, boundary location, mining, or other purposes. May calculate mapmaking information and create maps from source data, such as surveying notes, aerial photography, satellite data, or other maps to show topographical features, political boundaries, and other features. May verify accuracy and completeness of topographical maps. *Examples: Cartographic Technician; Map Drafter; Stereo Map Plotter Operator* 

### Training Category: Moderate-term OJT (1 to 12 months)

2007 Average Wage:	\$15.54
2006 Estimated Employment:	487
2016 Projected Employment:	579
Growth Rate, 2006-2016:	18.9%
Annual Openings:	18

Indus	stry	2006 Share	2016 Share
5413	Architectural and Engineering Services	58.3%	61.0%
	State Government, ex. Education and Hospitals	8.6%	7.6%
	Local Government, ex. Education	5.1%	5.0%
	Self-Employed Workers	4.1%	3.6%
511	Publishing Industries	n	n